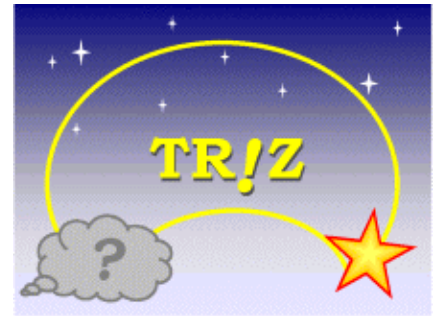


***3rd Forum on Knowledge Co-Creation
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For Establishing General Methodology of Creative Problem Solving & Task Achieving

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Introduction:

We want to solve problems (or troubles, difficulties).

We want to achieve our tasks (or targets).

-- Our fundamental desires in life and in society.

When conventional knowledge and means do not work,
we need to create new concepts and methods.

==> Creative Problem Solving & Task Achieving

The humans have been carrying this out for millions of years
to establish the culture.

Hence, examples of creative problem solving & task achieving are
everywhere, and processes for it are abundant.

It is never the case, however, that the methods for it are well recognized,
established, and widely used.

Hence we should establish
the general methodology for creative problem solving and task achieving.

Conventional methods for Creative Problem Solving & Task Achieving:

- (a) Basic approach in science & technology: Principles, theories, application & design methods in each discipline.
- (b) Approaches learning from cases: Building and using case bases and knowledge bases
- (c) Approaches to analyze the problems and tasks: Cause-effect, system, mechanism, etc.
- (d) Approaches to support idea generation: generating as widely and as freely as possible,
- (e) Approaches to arrange environment and take care of mental aspects:
relaxed feeling, free atmosphere, thinking the ideals, etc.
- (f) Approaches for realizing the idea: Selecting good ideas, designing & development, implementation, etc.: technologies in the discipline.
- (g) Approaches for thinking the future and suggesting the directions:
- (h) Approaches towards general methodologies for problem solving:**
Integrating all the approaches above to build a methodology useful and practical.
A system of methods suitable for each type/field of problems and tasks, and also
a system of methods universally applicable to a wide range of types and fields.

Approach of the present study:

Target: Establishing a general methodology for creative problem solving and task achieving

Main steps of my study:

Basic paradigm in science and technology: Four-Box Scheme of abstraction

Equivalent Transformation Theory (Kikuya Ichikawa): Function-oriented analogical thinking



TRIZ (Theory of Inventive Problem Solving): Knowledge bases and techniques across the fields.



USIT (Unified Structured Inventive Thinking): New paradigm: Six-Box Scheme

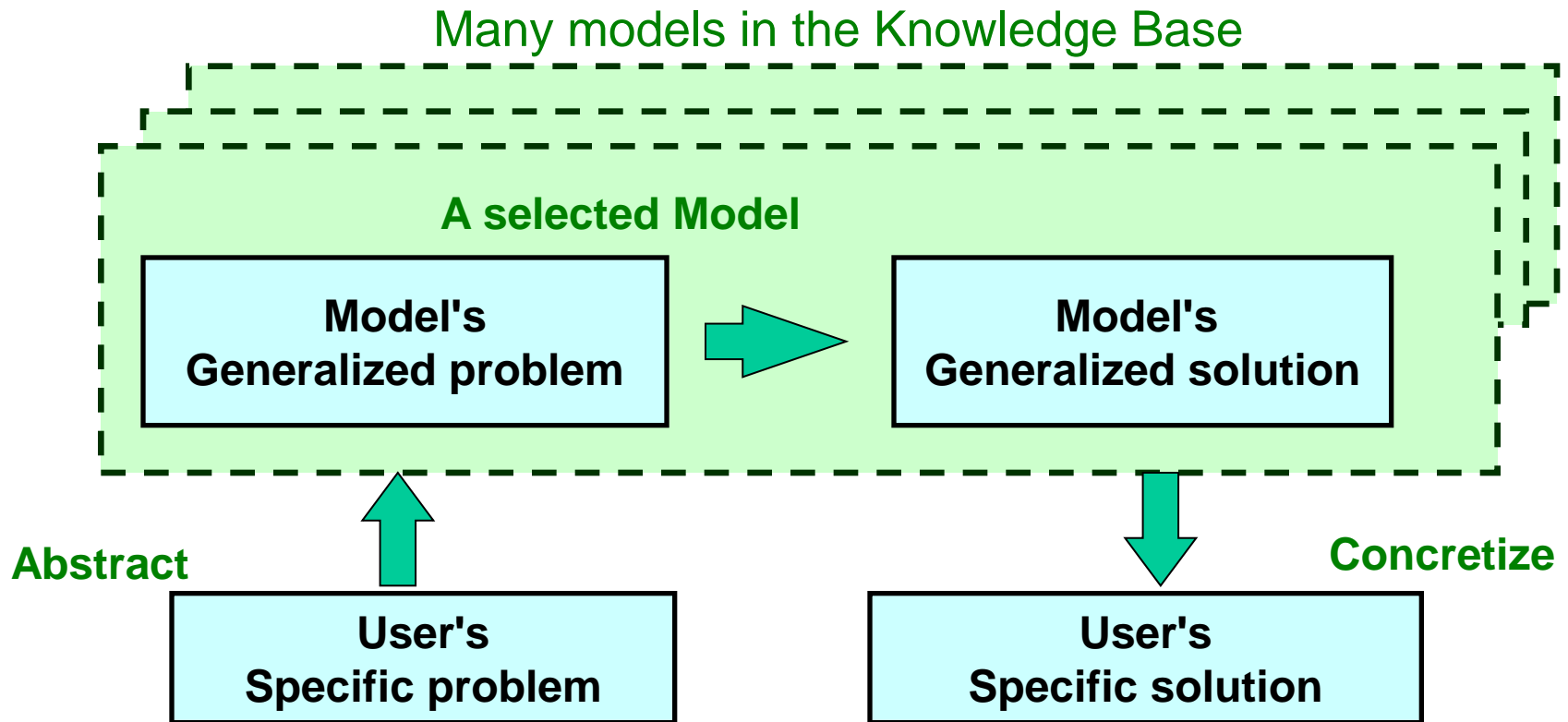


General methodology for Creative Problem Solving & Task Achieving

Basic scheme for Problem Solving (Conventional: "Four-Box Scheme")

Science & Technologies (Many models, specialized in areas)

==> (Traditional) TRIZ (Across areas, but many separate tools)

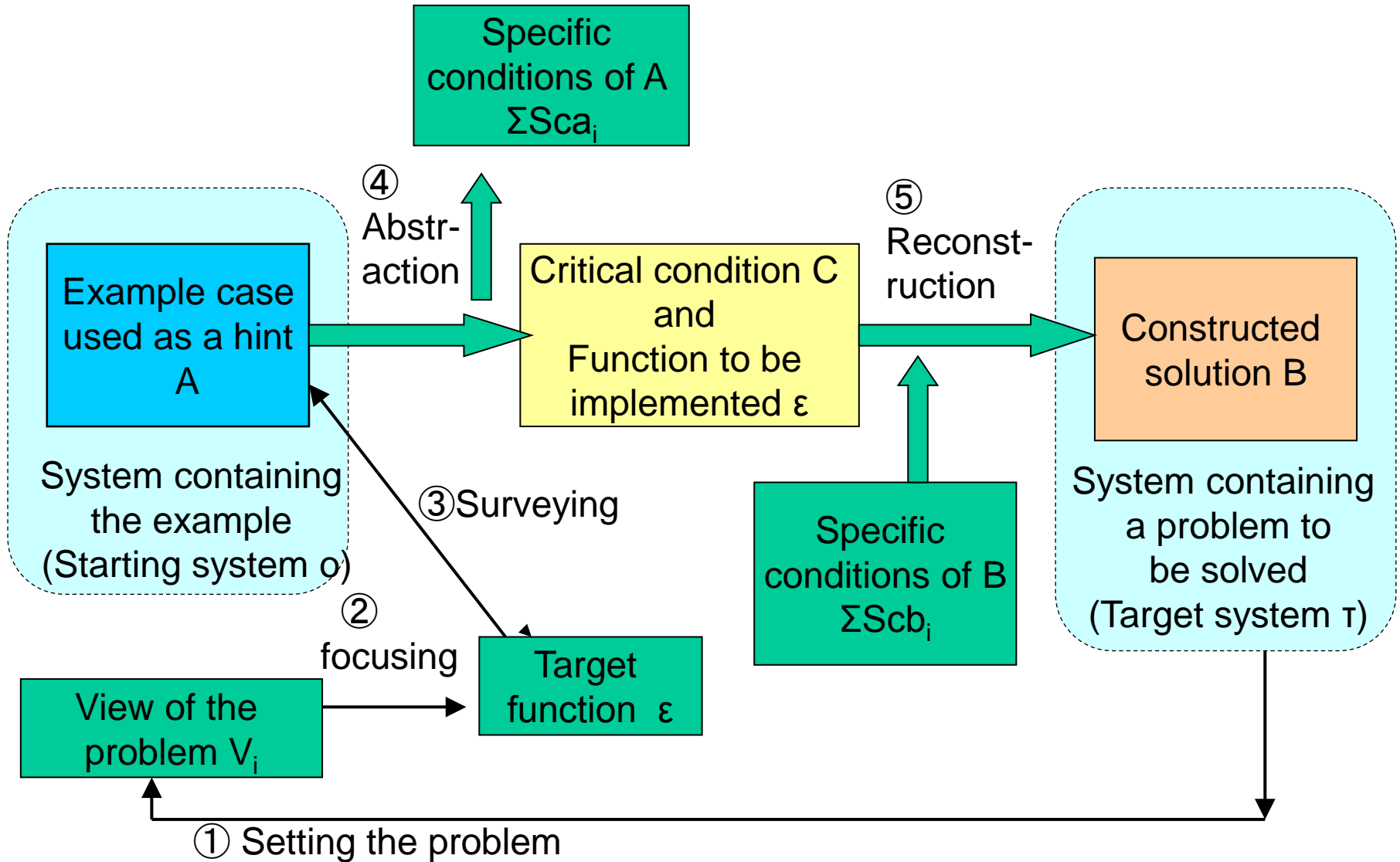


Problem is analyzed in an aspect and mapped onto a model.

→ Partial and insufficient analysis.

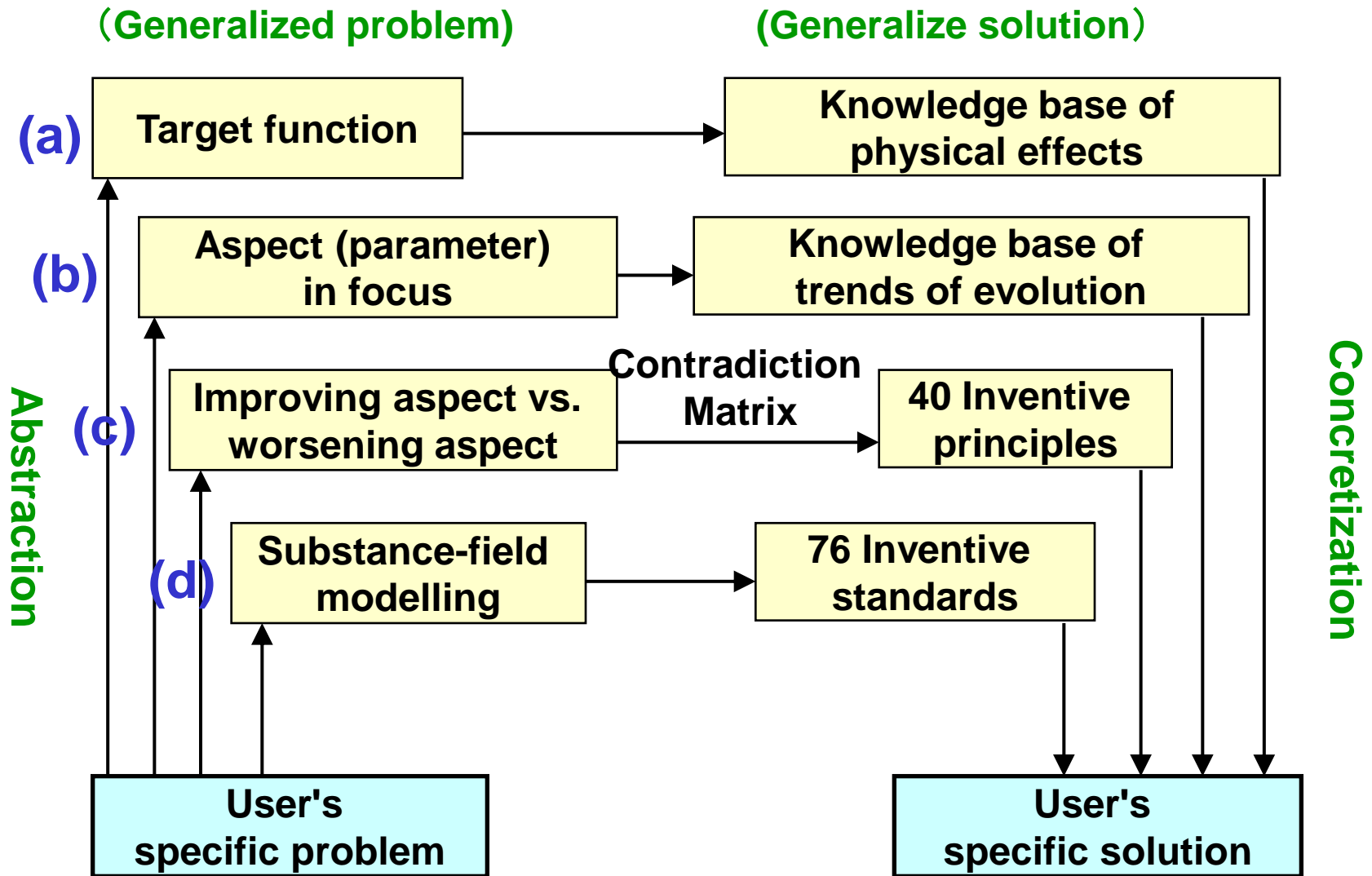
Equivalent Transformation Thinking (by Kikuya Ichikawa)

T. Nakagawa July 2005



Essence: Analogical thinking based on functional concept

Tools of TRIZ (Based on the Four-Box Scheme)

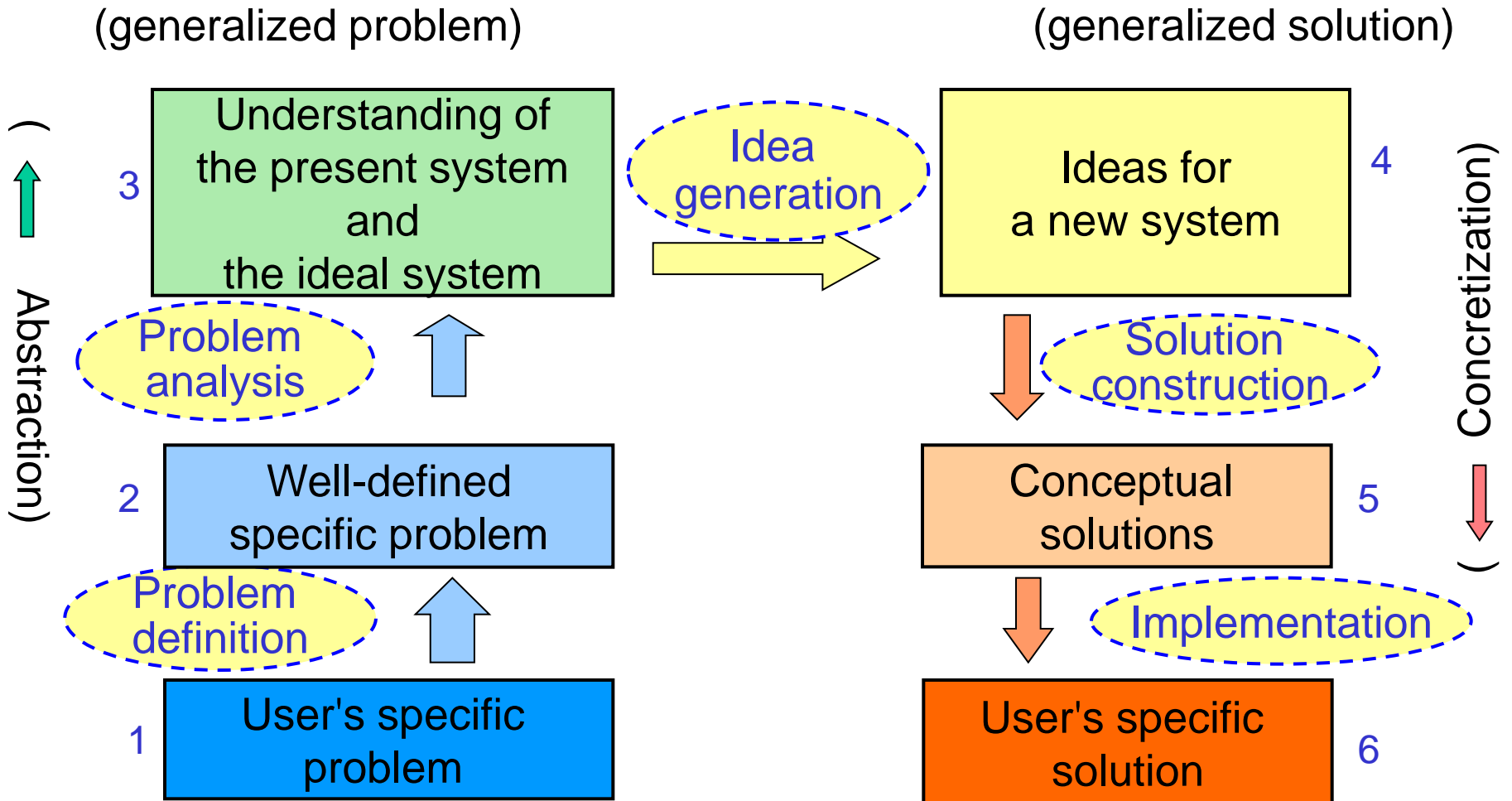


Essence: Many tools and huge knowledge bases are applicable across technical fields.
But parallel structure of multiple tools = partialness in each method

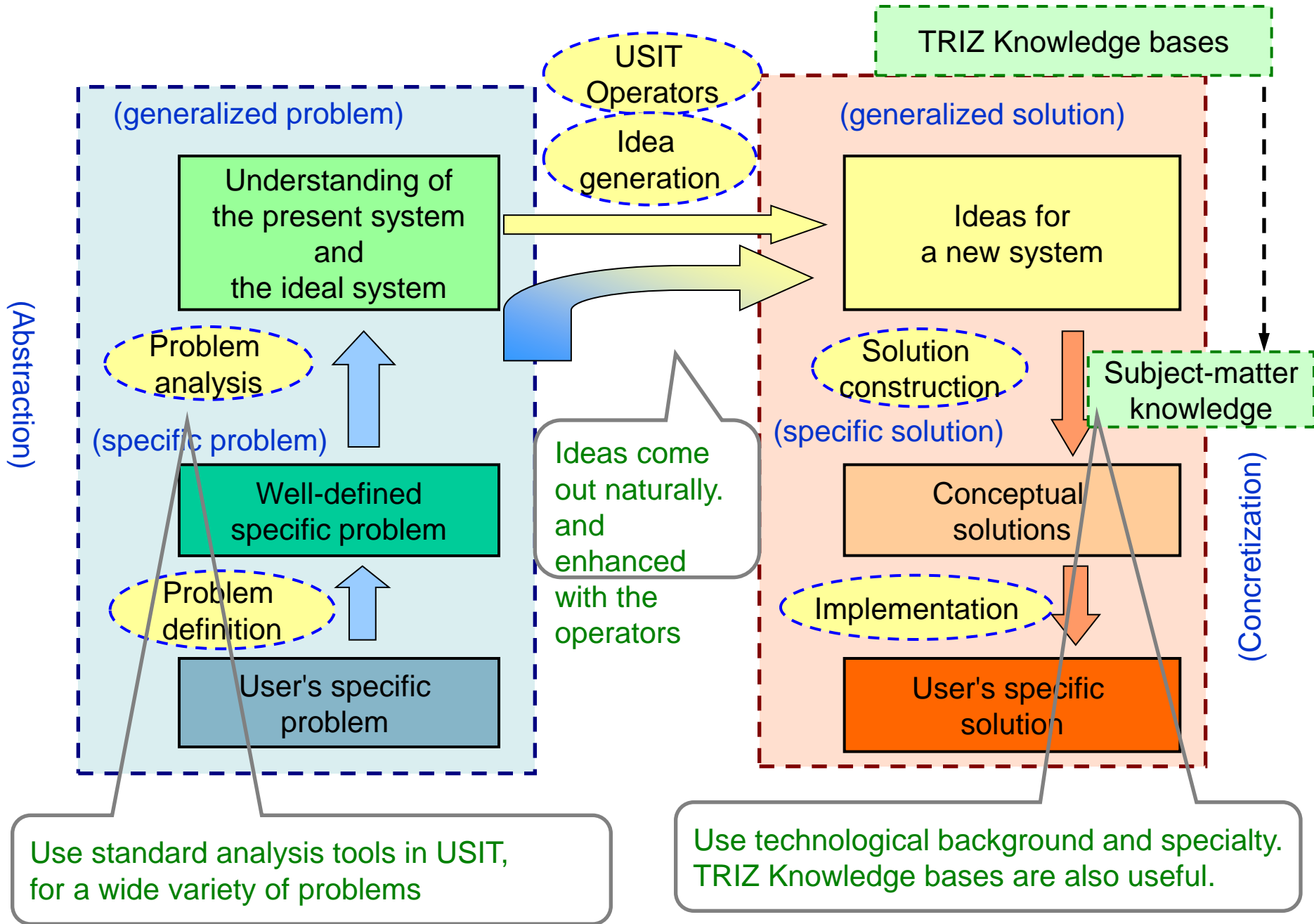
Six-Box Scheme of USIT: New Paradigm for Creative Problem Solving

Toru Nakagawa (2005)

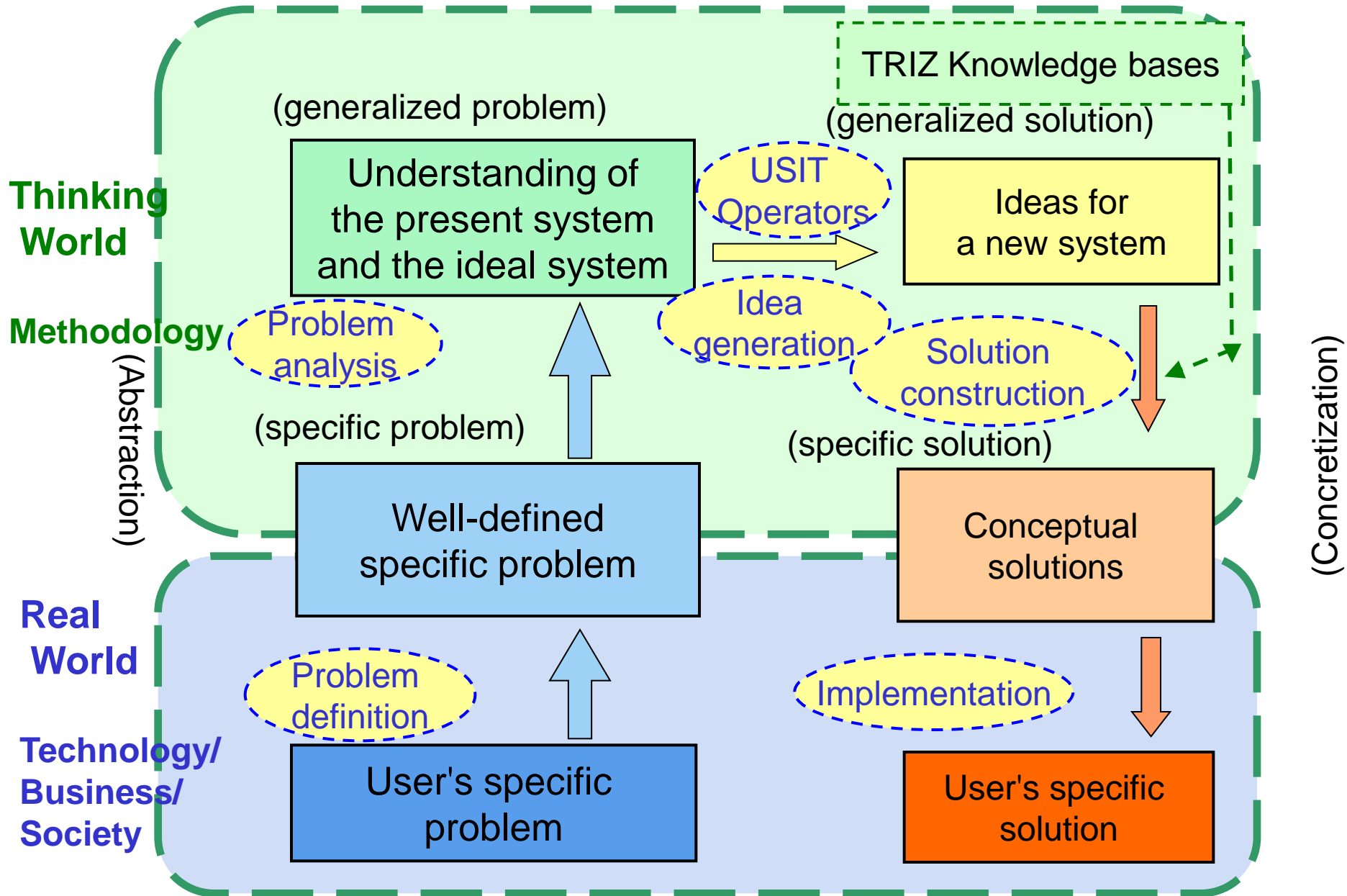
A unified method across the fields



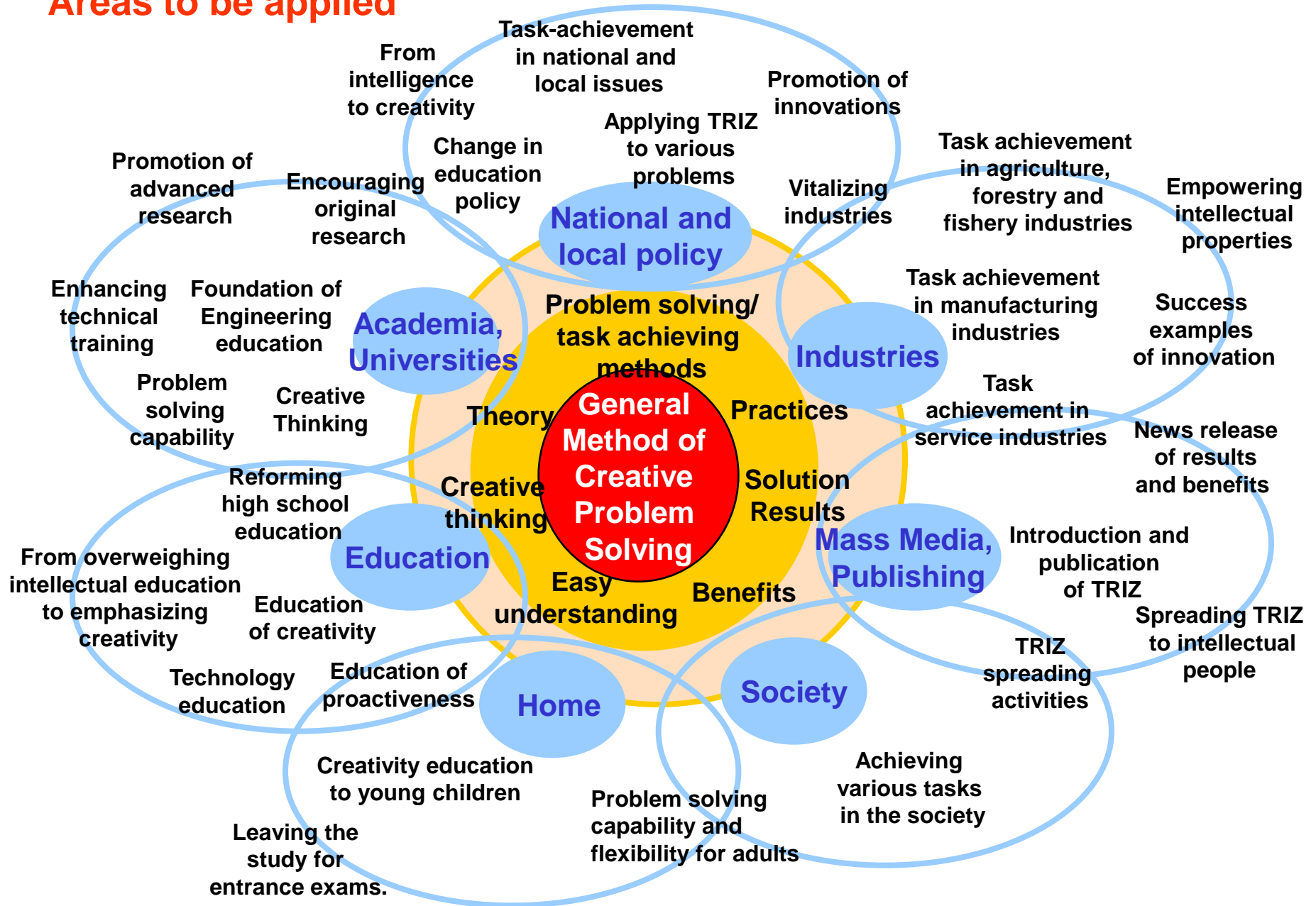
6-Box Scheme of Creative Problem Solving (USIT)



6-Box Scheme of Creative Problem Solving (USIT)



General Method of Creative Problem Solving & Task Achieving: Areas to be applied



General method for creative problem-solving/task-achieving (for technology)

Whole procedure

Consistent whole procedure

Simple/specialized processes

Finding the problem

Understanding the problem systematically

Consider the goals and tasks

Consider from broad perspectives

Focusing the problem

Understanding the present system

understanding difficulties and root causes

Understanding the mechanism of the present system

Functions & attributes

space & time characteristics

Clarifying contradictions

Examine various present solutions

Learn similar tasks in different fields

Imaging the ideals

Thinking the images of the ideals

Desirable behaviors & properties

Consider the direction of evolution

Generating ideas

Techniques of idea generation

Collection of possible hints

Resolve contradictions

Generate ideas as widely as possible

Identifying excellent ideas

Constructing solutions

Extending the ideas

Improving solutions with the ideas

Designing new solutions

Introducing good ideas used in different fields

Solving secondary problems

Identifying and evaluating excellent solutions

General method for creative problem-solving/task-achieving (for technology)

Requirements at the preceding stage

Applicable widely to science & technology

Mechanical, electrical/electronic, chemical, etc.

biological, medical, etc.

Using effectively the whole information in science & technology

Implementing the S & T information in the method.

Effectively using patent information

Possible to use concepts, theories, and methods in the subject-matter fields.

Use the method of system analysis in the subject-matter field.

Clear relationships with methods for technology development

Able to find and understand the problem in the real world

Able to focus down the problem and clarify the task.

Able to refer to S & T information whenever necessary

Able to solve problems creatively in the fields of Science & Technology

Whole procedure

Finding the problem

Understanding the present system

Imaging the ideals

Generating ideas

Constructing solutions

Introductory articles & materials

Textbooks of the methods

Application examples

Software tools & knowledge bases

Easy-to-understand methods.

Practical application methods

Chances to learn

Chances of training

Requirements at the succeeding stage

Able to construct solutions

Able to use designing techniques in the subject-matter field

Able to implement the solutions

Coordinated with methods for implementing solutions (CAD/CAE/CAM, Taguchi method, etc...)

Able to evaluate the solutions in the real world

Coordinated with industrial and company infrastructure, e.g., designing, manufacturing, and sales

General method for creative problem-solving/task-achieving (for non-technology fields) (e.g., humans, society, business)

Whole procedure

Consistent whole procedure

Simple/specialized processes

Finding the problem

Understanding the problem systematically

Consider the goals, tasks, and visions

From multiple perspectives

Focus the problem

Consider in steps

Understanding the present system

understanding difficulties and root causes

Understanding the mechanism of the present system

Functions & properties of organizations & persons

space & time characteristics

Clarifying contradictions

Examine preceding cases

Learn similar tasks in different countries, companies, and fields

Imaging ideals & visions

Thinking the images of ideals

Stating the vision

Consider the directions & steps of evolution

Generating ideas

Techniques of idea generation

Collection of possible hints

Resolve conflicts & contradictions

List up the ideas as widely as possible

Identifying excellent ideas

Constructing solutions

Extending the ideas

Improving solutions with the ideas

Designing new solutions

Introducing good ideas in different countries and fields

Solving secondary problems

Identifying and evaluating excellent solutions

General method for creative problem-solving/task-achieving (for non-technology fields) (e.g., humans, society, business)

Requirements at the preceding stage

Applicable widely to non-technological areas

Areas related to humans, society, business, etc.

From wide perspectives on world situations, society, etc. and also with delicate sense of humans

Using various preceding methods

TRIZ is extended from technical to non-technical areas.

Effectively using the knowledge of different areas

Possible to use concepts, theories, and methods in the subject-matter fields.

Use the method of system analysis in the subject-matter field.

Considering from wide perspectives on world situation, history, etc.

Able to find and understand the problem in the real world

Able to focus down the problem and clarify the task.

Able to refer to many previous cases and knowledge whenever necessary

Able to apply for policy making and solution planning

Able to apply for finding solutions in the cases of serious conflicts of interests/opinions

Able to merge the knowledge and abilities of all the persons involved

Whole procedure

Finding the problem

Understanding the present system

Imaging ideals & visions

Generating ideas

Constructing solutions

Introductory articles & materials

Textbooks of the methods

Application examples (with the results)

Software tools & knowledge bases

Easy-to-understand methods.

Practical application methods

Chances to learn

Chances of training

Methods to transfer to different fields

Requirements at the succeeding stage

Able to construct solutions

Able to use methods and institutions in the subject-matter field

Able to implement the solutions

Coordinated with various methods & institutions for implementing solutions

Solutions are effective and beneficial in the real world

Coordinated with real-world infrastructures, e.g., society, culture, and environment

Concluding remarks

In the technology fields,

'General methodology for creative problem solving'
is under construction with TRIZ/USIT in its framework and components.
Various methods and processes need to be associated and integrated.

Significance of the vision need to be understood widely.
Effective in technological innovation and creative research & education.

In the non-technology fields,

'General methodology for creative problem solving'
is similar to the one in technology in its framework and basic tools.

However, problems are often bigger, more complex, and delicate.
Mental aspects of stakeholders have bigger weight than tools.
Various methods need to be developed more clearly.